REMARKS

The Office Action, on page 2, indicates that the method claims were restricted out of this application. Following that, the apparatus claims remaining would be claims 18-25 and 32-37. That would suggest that claims 25-31 and 38-44 were withdrawn from this application. But claims 42-44 are not addressed in the action, and are reproduced as required by the form of amendments.

Claims 19 and 32 were rejected under 35 U.S.C. 112, first paragraph as containing "third contacts" and "electrically conductive wires joining second contacts to third contacts" that were not in the original specification. Claim 19 is amended herein to overcome this rejection, and claim 32 is deleted.

Claims 18, 19 and 32 were rejected under 35 U.S.C. 112, second paragraph, as not providing proper definitions of "die down and die up" orientations. Further the Examiner stated that it was not clear what are the structural differences between a die-up die and a die-down die, furthermore, the Examiner was not sure whether these claims included a substrate for one or two dies. As now amended these concerns have been addressed.

A telephone conference between the Examiner and Edwin Paul on 6/26/2003 discussed the definition of die up and down. Mr. Paul suggested that the definitions are to be found in FIG. 1, FIG. 2 and the associated text, especially on page 2, lines 17 et seq. That discussion centered on the point that the different orientation of the pads on the two chips was a meaningful difference. The difference is better termed as a "pin-out" difference. A "pin-out" refers to the functions associated with each pad or pin. Power, ground, signal in and out are on specific pins. So a chip with one pin-out cannot be mounted into a package meant to accept a different pin-out - without some other factor involved. The present invention provides that other factor.

The industry makes two different die packages to accommodate these different contact orientations. The inventive substrate reversed that orientation so that a single

package designed to accept a die-up die could be used with either chip orientation. The Examiner pointed out an apropos analogy regarding "orientation." That analogy viewed a left and a right hand as having the same elements, but with the hands having different orientations. The different orientations meant that the two hands were not interchangeable – there is a structural difference manifest in the orientation difference. So, a glove, that transformed a left hand into a right hand by re-orientating, say, the thumb or the fingers, would be an invention similar to the present invention that transforms, by reorientation, a die-down die pad orientation into a die-up pad orientation. The open-ended wording is clear in claim 18, as amended, re-orients one die, but the die is not part of the claim. Dependent claim 19 adds the die.

Claim 18 is specifically drawn only to a specific substrate arranged to accept a die with a die-down orientation. The substrate then provides output contacts arranged in a die-up orientation, so that a die –down die can be mounted to the substrate which then can be mounted into a package designed to accept a die-up die.

New claim 45 is for a package that receives the substrate of claim 18, and adds a lead frame and wires to make electrical connections from the substrate to the outside world, in the form of a printed circuit board. The lead frame contacts are described with respect to FIGS. 5 and 6, page 6, lines 8 and 21, and connections to a printed circuit board are described on page 6, line 9. Equivalent descriptions are found in other portions of the original application as well. The form of claim 45 includes the phrase "substrate of claim 18," but the specific elements of claim 18 could be inserted in place of the phrase.

Claims 20, and 23-33 have been deleted or withdrawn.

Claims 21 and 22, dependent from claim 19, add other structural details to the substrate of claim 1.

These remaining claims have been carefully reviewed to ensure proper antecedents are maintained and that no new matter is included. With respect to claim 18 as amended, page 4, lines 12 et seq. describes the "substrate" and the "traces." "Connector

wires" are found on page 4, line 24. The last functional phrase in claim 18 is based on the text on page 3, lines 4-16 (and elsewhere) in the original application.

With respect to the rejection of the claims over cited prior art:

Claims 18-21, 23, 24, 32-34, and 36 and 37 were rejected under 35 U.S.C. 102(b) as anticipated by U.S. patent no. 5,793,101 to Kuhn (Kuhn), especially his FIG. 2. Kuhn is analyzed below as it applies to claim 18 as amended and to new claim 45, as all the remaining claims depend from claims 18 and 45.

In Kuhn's FIG. 2, cited by the Examiner, a die, item 22, is mounted to a flex circuit 27, and another die, item 23, is mounted to the same flex circuit 27. Note that the flex circuit is folded around the paddle 20. Kuhn does not describe these chips with respect to pad orientation, nor does he consider pad orientation anywhere in this patent. If the flex circuit is unfolded and laid on a flat surface, both chips 22 and 23 are mounted on top of the flex circuit. Electrical connections from chip 22 are made at the top of the chip - in a typical die-up orientation (as in the present application), and note that chip 23 has no contacts made to it via wires. Note that Kuhn does not makes connections from his contacts 21 to chip 23 – the one on the bottom, and such contacts to the bottom chip are never shown or discussed anywhere in Kuhn. Kuhn does not discuss a package designed to accept a specific die orientation where a die with a different orientation can be mounted with an inventive substrate that performs the re-orientationl of electrical contacts (as in the present amended claims).

Kuhn with respect to FIG. 4, shows "flip chips" with solder bumps that are soldered directly to the flex circuit 27, thereby saving the bonding wires. Flip chips are old in the art, but are just another type mounting for a chip, and packages are designed to accommodate such chips. However, flip chips tend to be more expensive. But a flip chip is not a die-down chip needing bonding wires as described in the present application. Arguendo, the flex circuit in Kuhn could be used to re-orient the pin out of a single chip into that of another chip, but such a question or such a goal is not mentioned in Kuhn, and it is not fair to ask such a leading question. Kuhn simply is focused on mounting two or more

chips and making interconnections between those chips, and Kuhn does not expand his thinking, or mention, or suggest using his invention to perform the advantageous task of changing chip contact (pin-out) orientation, as claimed in the present invention.

Kuhn in col. 2, lines 7-23 clearly describes his invention as a "multi-die semiconductor package that allows a wide variety of existing semiconductor chips to be integrated on the same lead frame..." In line 20 Kuhn's invention is clearly for "two or more semiconductor dies." Just as clearly, the present invention applies to re-orienting the pads of a single die-down chip. Kuhn specifically excludes a single chip from his invention and does not discuss one chip in his specification. Moreover, Kuhn does not suggest the re-orientation of the pad layout of one type of chip (die-down) to that of another (die-up) to accommodate a single package type. The present invention allows a single die-up package to house either a die-up or a die-down (with the inventive substrate).

A practical example in accordance with present amended claim 18, that is not suggested in Kuhn, would include using a package that mounts on a printed circuit board and that accepts a die-up die – a die-up package. The package provides the proper arrangement of connections from the board for power, ground and signals to a die-up die that might be mounted in the package. If a die-down die was the only die available, that die could not be mounted into the die-up package. But if the die-down die were mounted to the inventive substrate of claim 18, that substrate with the attached die-down die could be properly mounted into the die-up package. The traces on the substrate contact the the die-down contacts that are then routed to other contact points oriented as would a die-up die. So the amended claim 18 re-orients the contacts of a die-down die into a pattern of a die-up die. Kuhn does not suggest such an arrangement.

Clearly, there is a genus of prior art of substrates or boards to which chips are mounted. The present invention is a species of this genus that accepts only a die-down type chip and re-orients the contacts (the pin out) of that chip to the pattern of a die-up die. Neither Kuhn nor the cited prior art suggest the specific substrate of the present invention, just as the genus does not suggest the species.

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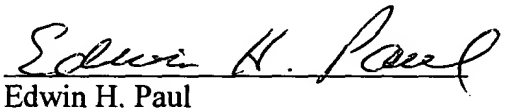
Respectfully submitted,



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